

## CLAIMS

1. An unmanned ocean vehicle for operating either on or below the surface of a body of water, said vehicle including:

- 5 • an enclosed hull having a payload bay;
- a hybrid propulsion system having energy collection means and energy storage means adapted for utilising at least solar energy and wind energy;
- a plurality of sensors for detecting predetermined environmental parameters; and
- 10 • a communications system for transmitting data from said sensors about selected environmental parameters to, and for receiving command signals from, one or more remote stations and/or cooperating ocean vehicles.

2. The unmanned ocean vehicle of claim 1 wherein the hull has an 15 outer configuration having the general appearance of an aquatic animal.

3. The unmanned ocean vehicle of claim 1 wherein the enclosed hull is adapted to facilitate selective operation of the vehicle on or below the water surface.

20 4. The unmanned ocean vehicle of claim 3 wherein the vessel includes ballast tanks for selective submerging and surfacing of the vehicle.

25 5. The unmanned ocean vehicle of claim 1 wherein the hybrid propulsion system includes a wing sail having an aerofoil configuration for propelling the vehicle using wind energy and having solar energy collectors disposed on the surface of the wing sail.

30 6. The unmanned ocean vehicle of claim 5 wherein the wing sail may be lowered to a declined position along the hull of the vehicle to reduce drag whilst continuing to collect solar energy.

7. The unmanned ocean vehicle of claim 1 wherein the energy storage means includes electrical storage cells, such as batteries or capacitors, coupled to solar energy collectors.

5 8. The unmanned ocean vehicle of claim 7 wherein the hybrid propulsion system includes an electrical machine mechanically coupled to a fluid drive element, wherein the electrical machine may be supplied from the storage cells to drive the fluid drive element in a motor mode or, in the alternative, the electrical machine may be driven by the drive element through wave action, water  
10 currents or during regenerative sailing to charge the storage cells in a generator mode.

9. The unmanned ocean vehicle of either claim 7 or claim 8 wherein the capacitors or other rapid energy discharge devices, such as fluid accumulators,  
15 provide the vehicle with a short sprint capability.

10. The unmanned ocean vehicle of claim 1 wherein the payload bay is internally powered in order to carry electronic equipment supporting the environmental sensors for oceanographic or military use, live-saving or fire-fighting  
20 equipment for search and rescue, and/or weapons relating to desired vehicle operations.

11. The unmanned ocean vehicle of claim 1 wherein the environmental sensors may include sensors selected from the group including:

25 anemometers,  
wind vanes,  
radars,  
radio frequency interceptors,  
optical band sensors,  
30 infrared band sensors,  
chemical/biological sensors,  
ocean current sensors,  
acoustic sensors, and

bathymetric sensors.

12. The unmanned ocean vehicle of claim 1 wherein the communications system may include a global positioning system transmitter  
5 and/or receiver, a LFB/SWB/marine band receiver, a wide band receiver, and a satellite receiver, together with suitable antenna arrays.

13. The unmanned ocean vehicle of claim 12 wherein the antenna arrays include deployable antennae arrays, suited to towed operation when  
10 receiving signals ranging from extremely low frequency (ELF) band to super high frequency (SHF) band, capable of transmission and reception in these bands

14. The unmanned ocean vehicle of claim 2 wherein the vehicle is able to dive under the surface for prolonged periods using stored energy to avoid ships,  
15 storms or for stealth operations.

15. The unmanned ocean vehicle of claim 2 wherein the hybrid propulsion system further includes a fuel cell for emergency use, such as emptying ballast tanks, to surface after a prolonged period of submerged operation.

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16. The unmanned ocean vehicle of claim 1 wherein the hybrid energy propulsion system further utilises, in addition to wind energy and solar energy, only renewable energy sources, including:

25 wave energy;  
temperature differential; and  
sea water activated batteries or fuel cells.